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1/1,000,000 mol. repels, while it requires a somewhat stronger solution of hydrochloric acid to attract, and 1/600 mol. of the latter is the optimum for attraction. In acids the attraction is parallel to the dissociability. In high concentrations acids repel, due in strong mineral acids to the excess of hydrogen ions, and in weak organic acids to the undissociated molecules. In many of the latter acids the strong attraction of the hydrogen ion and weak repulsion of the molecule leads to injury and death of the spores because of the toxicity of the latter. The reaction, both negative and positive, is "apobatic" (PFEFFER's terminology) or involves "motor reflex" (JENNINGS). JENNINGS maintains that all tactic responses in animals are of this type, and that PFEFFER's so-called "strophic" reactions do not appear. He thinks it likely also that the same is the case in plants, and KUSANO's work brings more evidence for the support of this probable contention.—WILLIAM CROCKER.

Germination of spores of rusts.—In a paper by SCHAFFNIT²¹ some observations and experiments are given which seem to throw some light on the questions relating to the germination of uredospores and aecidiospores of the rusts. The irregularity of germination of these spores is well known to all experimenters, but no satisfactory explanation for their behavior has been given. SCHAFFNIT finds that the capacity for germination depends largely upon the degree of maturity of the spores. By mature spores he understands only those which have fallen from their stalks without being shaken by air currents or rain. Ordinarily large numbers of spores fall from the sori on account of the motion of the infected leaves, caused by the wind. The majority of these spores do not germinate, but if spores are gathered on a hot quiet day, when there is no wind, 80-100 per cent germinate within two hours. The thoroughly ripened spores have a darker color than the immature ones. Spores which have been separated prematurely from their pedicels are incapable of being ripened afterward. It seems, also, that spores cannot be ripened on leaves that have been cut from the plants. These observations suggest an interesting field for further investigation in the ecology of fungi. It must be confessed that our knowledge of the actual behavior, means of distribution, and germination of fungus spores in nature is very meager, even as to fungi of economic importance. Any contribution to this subject is important. The wide application of these results, which the author makes, would hardly seem justifiable until more extended and more accurate experiments have been conducted.—H. HASSELBRING.

Color production in *Penicillium*.—The effect of external factors on the color production of a certain species of *Penicillium* has been investigated by DOEBELT.²² It seems that in agar cultures the pigment, which is red, appears first near the

²¹ SCHAFFNIT, ERNST, Biologische Beobachtungen über die Keimfähigkeit und Keimung der Uredo- und Aecidiensporen der Getreideroste. Ann. Myc. 7:509-523. 1909.

²² DOEBELT, H., Beiträge zur Kenntnis eines pigmentbildenden *Penicilliums*. Ann. Myc. 7:315-338. 1909.